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ABSTRACT

In 1991, a study was conducted by Oakland Community College (OCC) to evaluate the need for a proposed Civil Engineering Technology program. An initial examination of the literature focused on industry needs and the job market for civil engineering technicians. In order to gather information on local area employers' hiring practices and needs, a survey was sent to 75 local engineering firms. The survey, which addressed the specific areas of employment demand, employment benefits, and career preparation, yielded a 76% response rate. Key findings included the following: (1) over 67% of the survey respondents currently employed civil engineering technicians, and while almost 69% were not currently hiring new technicians, over 72% anticipated hiring them within the next 5 years; (2) the literature in all major journals reviewed suggested that there was a serious shortage of civil engineer technicians and civil engineers; (3) according to the Michigan Occupational Information System, annual salaries for civil engineering technicians who hold associate degrees range from $9,360 to $18,000 in the state; (4) over 76% of survey respondents indicated that it was not possible to advance to the position of civil engineer without obtaining a bachelor's degree; (5) a total of six institutions of higher education in Michigan offered programs in civil engineering technology or civil technology; (6) over 88% of survey respondents felt that there was a need for more training/associate degree programs in civil engineering technology; and (7) over 43% of respondents indicated that they would be interested in having an OCC student work as an intern during the student's college training. Appendixes provide the survey instrument and a list of firms willing to accept an OCC student intern. (JMC)

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ED345795

Civil Engineering Technology
Needs Assessment

Office of Institutional Research
Oakland Community College

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July 1991

JC 920 275

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CIVIL ENGINEERING TECHNOLOGY
NEEDS ASSESSMENT

The purpose of this report is to present information to assist in evaluating the need for a for a Civil Engineering Technology program at Oakland Community College.

Initiation

Initiated by William J. O'Mahoney, Dean of Academic Services, Auburn Hills, and continued by Bill Rose, Dean of Academic Services, Auburn Hills, this assessment involved a literature review including information from the Michigan Occupational Information System (MOIS), an examination of related academic programs in institutions of higher education within Michigan and a survey of seventy five local engineering firms, the most common employers of civil engineering technologists.

Description of Proposed Program

The Civil Engineering Technology Program would provide the general, supportive, and technical education necessary for the student who completes the program to obtain a technician position in one of the following fields of civil engineering:

Design of highways and other public works
Construction of highways and other public works
Surveying of highways and other public works
Traffic and transportation engineering
Environmental and solid waste planning, design, and construction
Traffic signal design, construction, and maintenance

The proposed program, resulting in an associates degree in applied science-civil engineering technology, would consist of 28 credit hours of major requirements, 20 credit hours of supportive courses, and 16 credit hours of general education courses.

The major requirements for the Program would include:
CET 100 (3) Property of Engineering Materials
CET 110 (3) Engineering Plans & Specifications
CET 120 (4) Surveying for Construction
CET 130 (3) Nature of Soils
CET 140 (4) Highway Design
CET 150 (3) Bituminous and Concrete Materials
CET 160 (3) Highway and Structure Maintenance
CET 170 (4) Route Surveying
CET 180 (4) Construction Safety and Traffic Maintenance
CET 190 (3) Traffic Flow and Data
CET 200 (4) Traffic Signal Control
CET 210 (4) Highway and Construction Drainage
CET 220 (3) Environmental Testing and Solid Waste

CET 220 (3) Environmental Testing and Solid Waste

The supportive courses would include:
MAT 115 (4) Intermediate Algebra
MAT 156 (3) Trigonometry
DPR 103 (4) Principles of Computer Information Process
DRT 111 (3) Introduction to Technical Drawing
CAD 110 (3) Introduction to Computer Aided Design (Design Track)
CAD 120 (3) Computer Aided Design Applications I (Design Track)
PHY 161 (4) College Physics I
QAT 100 (3) Total Quality Control (Inspection Track)
QAT 101 (3) Principles of Quality Assurance (Inspection Track)
ELT 121 (3) Basic Electricity I (Signal Track)
ELT 124 (3) Basic Electricity II (Signal Track)

The general education courses would include:
(3) Communications/English
(3) Fine Arts/Humanities
(3) Mathematics/Science (fulfilled above)
(3) Social Science
(3) American Government (POL 151)
(3) Written Communication
(1) Physical Education

Each of the Civil Engineering Technology (CET) courses would be new to the College upon approval of the Program. The other courses are already in existence and being offered at Oakland Community College.

The Accreditation Board for Engineering and Technology, Inc. (ABET) has established criteria for accrediting programs in Engineering Technology. The relevant criteria have been included in the proposed Civil Engineering Technology Program.

Description of Occupation

Civil engineer technologists work under the direction of civil engineers and physical scientists. They work on the design and construction of roads, airports, tunnels, bridges, water supply systems, sewage systems and buildings. Technicians must apply theories and principles of civil engineering in planning, designing and overseeing the construction and maintenance of structures and facilities. According to MOIS civil engineering technologist's responsibilities include the following:

1. Overseeing production orders and assisting in the preparation of work schedules.
2. Developing cost estimates of work to be

completed.

3. Setting up and maintaining monitoring equipment to obtain samples, measurements and other data.
4. Conducting preliminary inspections to assure standards are being met.
5. Performing various other duties such as filing plans and prints, answering questions and directing appropriate work to operators and other workers.

Other job titles for people trained in civil engineering technology include:

- Chemical Technician
- Drafter
- Electrical/Electronics Technician
- Metallurgical Technician
- Petroleum Technician
- Mechanical Engineering Technician
- Industrial Engineering Technician
- Robotics Technician

Calculus-based coursework and further formal education is usually required in order for a civil engineer technician to advance to a position as a civil engineer. Degree programs for civil engineer technicians require technical math and science courses which are not calculus-based.

Relation of Proposed Program to College Mission

The proposed Civil Engineering Technology program relates to the College mission in that OCC will maintain a curriculum responsive to the changing educational needs of the residents of the district. The range of learning experiences provided will include theory, practical application and real life situation (Mission Goal C--Flexible Curriculum). OCC will continue to search for creative, innovative and, when appropriate, risk-taking strategies which will meet the needs of the ethnically, racially and economically diverse populations and institutions within OCC's urban, suburban and rural communities (Goal 2, Objective C--Program Development).

Methodology

An examination of the literature focused on two specific areas pertinent to civil engineering technology: first, industry needs and second, the job market. The literature review dealt primarily with civil engineering; however, it is most often the case that civil engineer technicians are hired by the same firms that employ civil engineers. Civil engineering technicians are also most often

supervised by civil engineers.

Additional information subsequent to the literature review was warranted, to gather information about local area employer's hiring practices and needs for civil engineering technicians. A survey was designed and sent to seventy five local engineering firms (see Appendix A) to assist in the civil engineering technology program assessment.

Methods of Data Collection

In order to gauge the need for a civil engineering technology program and how the college could meet these needs, survey questionnaires were sent to seventy-five local engineering firms that employ civil engineers and civil engineering technicians (See APPENDIX B). These firms included government agencies, state and county office, as well as private engineering firms. The survey addressed three areas:

1. Employment demands
2. Employment benefits
3. Career preparation

Survey questions about employment demands included inquiries about current employment of civil engineering technicians, and future employment needs, such as needs to retrain current employees, and the need to increase civil engineering technology staff. Survey questions concerning employment benefits included inquiries about salary levels, advancement opportunities, and other reasons for choosing civil engineering technology as a career. Survey questions focusing on career preparation included requests for identifying needed skills and credentials, comments on the adequacy of currently available training, and assurances about the availability of training at the engineering firm for potential Oakland Community College students.

Methods of Data Analysis

76% of the surveyed engineering firms responded. Data were analyzed by means of frequency distributions and content analysis of narrative responses.

Analysis

Employment

In 1985, there were approximately 2,550 civil engineer technicians employed in Michigan, most working in urban areas (MOIS). Projected growth in major regions of the state is ten to

thirty percent within a ten year period. An annual average of 90 openings is expected with 60 due to replacement and 30 due to natural growth. Table 1 (below) represents employment projections in fourteen major geographic regions in Michigan by 1995.

****INSERT TABLE 1*****

Of the responding engineering firms surveyed, over 67% answered that they currently employ civil engineering technicians. However, as shown in Table 2 (below), almost 69% indicated that they were not currently hiring new civil engineering technicians, but over 72% anticipated hiring additional civil engineering technicians between 1991 and 1995. As shown in Table 3 (below) over 50% of the respondents who said that they would be hiring more civil engineering technicians in the future, said that their most likely reason for doing so would be because of an increased volume of business. Over 73% of respondents reported that they believed there was a growing need for civil engineering technicians in the industry.

INSERT TABLE 2
INSERT TABLE 3

Information available about the civil engineering industry focused a great deal on civil engineers. Since many firms that hire civil engineers also hire civil engineer technicians, the information following would be relevant in focusing on the future of civil engineering technology as a career. According to employment statistics from the Michigan Occupational Information System (MOIS), in 1985 there were approximately 5,050 civil engineers employed in Michigan. They worked for highway and building construction firms, government agencies, consulting firms and manufacturing companies (MOIS, 1989). Also according to MOIS (1989), employment for civil engineers in Michigan is expected to increase faster than the average for all occupations in the 1990s. Expected increases are based upon public concern for protection of the environment, redevelopment of urban areas and road work for new residential areas. Table 2 (above) represents 1995 employment projections for civil engineers in fourteen major areas within the State of Michigan.

A growing market for civil engineers involves the problems of hazardous or toxic waste dumping and growing societal concern to correct the unsafe practices of the past. New federal regulations will require the use of highly trained specialists in this field especially as it relates to health and safety (Brown, 1989; Engineering News Record, 1988).

Infrastructure repair is another growing concern in many states. An Engineering News Record survey indicated that Michigan is ranked thirteenth out of twenty states with the largest road and bridge market in the United States (Hannan, 1990). There are also indications that major cities outside of Michigan will have an increased need for civil engineering technicians. Many cities on the East coast and Midwest need to repair or replace deteriorating roads, bridges and sewer/water lines (Ichniowski, 1990).

A weakened economy has affected the construction industry in the area of single-family housing. As a result, the industry is looking towards nonresidential markets in commercial and industrial construction. In addition, building construction by government and educational institutions is expected to increase (Hannan, 1990).

In the area of wastewater management, there is a projected ten billion dollars of work needed in several California cities within the next ten years (Civil Engineering,1989). Other points of concern include the conservation of water and wastewater management in the desert Southwest. In the Detroit Metropolitan area, employers are hiring civil engineers to work in the area of environmental control which includes wastewater management.

The literature in all major journals reviewed suggest that there is a serious shortage of civil engineer technicians and civil engineers. Retraining in new technology is needed to combat a growing market dealing with hazardous waste and other environmental issues. In addition, there are not enough trained manpower to meet the demand for infrastructure repair as states seek government and local funding to start construction (Merwin, 1990).

A common theme cited in the literature is that professionals in the field of civil engineering are looking to develop new manpower sources, especially women and minorities, since white males are leaving the field. Women have been reluctant to enter the field due to a lack of mentors (Engineering News Record, 1988). In addition, women perceive the field to be low tech, a perception that is also shared by the general public (Engineering News Record, 1988).

Minorities tend to associate construction work with common labor. However, as education levels increase, minorities are increasingly entering the more prestigious engineering fields (Engineering News Record, 1988). The National Action Council for Minorities in Engineering (NACME), the American Consulting Engineers Council (ACEC), the American Society of Civil Engineers' (ASCE) and the National Science Foundation (NSF) are actively encouraging minorities to enter the field by providing financial incentives to facilitate their education. Nevertheless, a Fall 1989 report from the Engineering Manpower Commission indicated that from 1988 to 1989, the total female undergraduate population in engineering had decreased, but the female population in graduate

TABLE 1
MICHIGAN EMPLOYMENT OUTLOOK FOR
CIVIL ENGINEERING TECHNICIANS

REGION	Number Employed 1985	Percent Growth 1995
Detroit Metro	1,640	10.0
Kent County	50	10.5
Flint	250	29.3
Lansing	125	10.4
Washtenaw Area	125	12.6
Sgainaw Bay, Midland	75	8.7
Kalamazoo	25	39.9
Upper Peninsula	25	25.7
Jackson	50	10.2
Berrien, Cass, VanBuren	25	18.4
Ottawa-Allegan	25	20.0
Battle Creek	25	14.0
N.W. Lower Peninsula	25	30.6
Muskegon	25	25.0

SOURCE: MOIS transcript #403

TABLE 2
SURVEY RESULTS ON PROJECTED HIRING OF CIVIL ENGINEER TECHNICIANS
FROM 0 TO 10 YEARS

CIVIL ENGINEERING FIRMS CURRENTLY HIRING
CIVIL ENGINEERING TECHNICIANS:

CURRENT HIRING	31.5%
NOT HIRING	68.5%

CIVIL ENGINEERING FIRMS ESTIMATES
ON HIRING BETWEEN 1990-1995

CIVIL ENGINEERING TECHNICIANS NEED BY FIRMS (1990-1995)	PERCENTAGE OF FIRMS
0	27.8
1	16.7
2	14.8
3	9.3
4	5.6
5	9.3
6	1.9
9	1.9
10	1.9
15	1.9
20	3.7
25	3.7
60	1.9

TABLE 3
MOST COMMON REASONS CIVIL ENGINEERING FIRMS CITED
FOR HIRING NEW CIVIL ENGINEERING TECHNOLOGISTS
DURING THE NEXT 5 YEARS (1990-1995)

INCREASED VOLUME OF BUSINESS	51.3%
EXPANSION OF FIRM	23.1%
RETIREMENT OF CURRENT EMPLOYEES	20.5%
OTHER	5.1%
	100.0%

school programs had increased. The representation of Black undergraduates in engineering had increased by 712 by 1989 and Hispanics had increased by 557.

The shortage of manpower may also affect academia. An Engineering News Record study indicated that 22% of faculty in civil engineering are expected to retire within the next decade (Rubin, 1988). Decreased research funding offers little incentive for engineers to stay in academia. The shortage of teaching faculty could affect attempts to increase skilled manpower. However, a telephone poll of civil engineering departments of five major universities in Michigan indicated that recruitment of faculty has not been a major problem. Also, community colleges are more likely to employ part-time civil engineer practitioners which allow universities to concentrate their full-time faculty in the more specialized graduate and upper division courses.

Employment Benefits

According to MOIS, based on education, work experience and areas of specialization, civil engineer technicians, on a national level, earn an average annual salary of $17,8979 to $34,742. There is a potential for advancement in the field with additional college education and work experience. The average annual salary for a Michigan graduate with an associate's degree is between $9,360 and $18,000 according to MOIS. In Oakland County, civil engineer technicians employed by the Government earn between $16,205 and $28,289 annually. In Michigan, civil engineer technicians are not required to be certified, but some employers may require certification in specialized areas. Employers may hire individuals with related backgrounds, but they prefer to hire graduates of a formal Civil Engineer Technician program (MOIS). The survey of local engineering firms supports the MOIS information on salaries.

Survey respondents provided information regarding employment benefits, such as salary and advancement opportunities. The ranges in annual salaries that area engineering firms presently offer to civil engineering technicians are as follows:

	LOW	HIGH
ENTRY LEVEL	$10,000	$34,729
UPPER LEVEL	$10,000	$52,000

The salary range from entry level to upper level indicates that civil engineering technicians have much room for economic advancement within their field.

In the area of career advancement, many firms reported a variety of different job positions and titles that would be

possible for an experienced civil engineering technician to advance to over time. These titles and positions included:

Registered surveyor	Assistant estimator
Program manager	Estimator
CADD supervisor	Chief estimator
Plant engineer	Draftsman in charge
Jr/Intermediate Engineer designer	Expeditor
Inspector	Office supervisor
Materials technician	Lead technician
Civil engineer assistant	Supervisor of field
Project Manager	Laboratory supervisor

Many firms also reported offering on the job training to their employees to help enable them to advance to such positions.

Over 76% of those firms that responded reported that it was not possible to advance to a position as a civil engineer without further coursework. It was generally agreed that a civil engineering technician would need to obtain a bachelors degree in civil engineering in order to advance to such a position. A civil engineering bachelors degree program would require much calculus and math-based coursework that is not present in standard civil engineering technology programs.

Career Preparation

According to the literature search, a total of six institutions of higher education in Michigan currently offer programs in civil engineering technology or civil technology. Each institution is listed below along with a brief description of their program.

Alpena Community College: Offers an Associate of Applied Science degree in Concrete Technology which covers aspects of concrete manufacturing and building construction. The degree requires 58 credit hours for completion. The College also offers an associate's for transfer in civil engineering.

Delta College: Offers a 42 credit hour certificate in Residential Construction geared toward the housing and business industry. With an additional 25 credit hours, a student can earn an Associate of Applied Science degree in this field.

Ferris State University: Offers an Associate of Applied Science degree in Construction Technology which includes road work, building construction, airport construction and railroads. The degree requires 99 quarter credit hours for completion.

Grand Rapids Junior College: Offers an Associate in Civil

Engineering Technology for transfer and an Associate of Applied Science degree in Water Purification Technology. Water Purification Technology trains individuals to work with water quality and treatment. This degree requires 66 credit hours for completion.

Macomb Community College: Offers a 62 credit hour Associate in Applied Science degree and a 30 credit hour certificate in Civil Technology geared toward construction and water/waste water systems. In addition, MCC offers an Associate degree of Applied Science in Construction for mid-managers.

Michigan Technological University: Offers a 102 quarter credit hour program in Civil Engineering Technology for an Associate in Applied Science. This program provides training in surveying, drafting, soil technology, computer applications and construction.

Table 4 lists Michigan colleges and universities offering two year transfer degrees or advanced degrees (bachelor's, master's, doctorates), in civil engineering.

INSERT TABLE 4**

In 1988, the Engineering News Record reported that recruitment of students into civil engineering programs was increasing at the college level. However, a September 1989 report in Chemical Engineering indicated that recruitment activity in civil engineering programs was low compared to the previous year, but enrollments were expected to remain steady. However, when the department chairs of five major universities (Michigan Technological University, University of Detroit, Michigan State University, Wayne State University and the University of Michigan-Ann Arbor) were contacted for information regarding their Civil Engineering program, all five chairpersons indicated that traditionally, average enrollment in civil engineering was lower than any other engineering program. In addition, they indicated that placement rates for civil engineer graduates of their schools is 100%. They also reported that graduates are more likely to be hired by local, state and federal governments, while fewer are hired by private engineering firms.

Some universities such as Lawrence Technological University and Michigan Technological University offer bachelor's degrees in Civil Engineering and Civil Engineering Technology. The objectives and course work associated with these programs are very different such that accreditation standards do not permit the exchange of courses between the two programs. The curriculum for civil engineering is calculus-based, while civil engineering technology courses are not. All five chairpersons contacted, indicated that they do not accept Civil Engineering Technology Associate degrees

for transfer into their Civil Engineering program. However, they do accept the current Oakland Community College pre-engineering course work for transfer into their Civil Engineering degree program.

Over 88% of survey respondents believed that there is a need for more training/associates degree programs in civil engineering technology. Over 43% of respondents said that they would be interested and willing to have an Oakland Community College student work as an intern at their firm during the student's college training, and a further 31% felt that they might be willing to have an intern under certain circumstances (see Appendix B).

SUMMARY

Based on this initial assessment there appears to be evidence that supports the notion of future economic growth and productivity in the field of civil engineering. Demand in Michigan and other states primarily concerns the areas of road construction and repair, wastewater management, industrial construction and hazardous waste disposal management. Employers currently report a shortage of manpower in civil engineers and technicians. Furthermore, as construction projects and federal dollars increase in the 1990s to address growing concerns over infrastructure repair and environmentally related issues, the shortage of trained technicians and engineers to fulfill the demand will continue to grow. From our survey, it does seem that local area employers are optimistic of the growing future for civil engineering technicians. Further, there does seem to be a wide variety of advancement opportunities for civil engineering technicians, although becoming a civil engineer does require more formal education and a heavier emphasis on math related coursework.

Appendix A
Civil Engineering Technology Survey Cover Letter

DATE

SAMPLE

Dear SAMPLE:

The Office of Institutional Research at Oakland Community College is assessing the need for a proposed Civil Engineering Technology program. At this stage in the assessment process we need to ascertain current and future employment for Civil Engineering Technologists. As potential employers you can provide us with the insight that is needed to further develop this program.

Please take five minutes to complete the enclosed questionnaire and return it to us within seven days in the self-addressed, postage paid envelope which is provided. Your comments will help Oakland Community College in making decisions with regard to the establishment of this program. If you should have any questions, please feel free to contact me at (313) 471-7746. Thank you.

Sincerely,

Martin A. Orlowski, Director
Office of Institutional Research

MAO/pc
Enclosure

APPENDIX A

OAKLAND COMMUNITY COLLEGE
CIVIL ENGINEERING TECHNOLOGY PROGRAM
NEEDS ASSESSMENT SURVEY

Instructions: Please respond to each of the following questions based on your knowledge of the current and future status of Civil Engineering Technology in your firm. When finished, place the completed survey in the pre-addressed, postage-paid envelope and mail. Thank you for your help.

1. How many Civil Engineering Technologists does your firm currently employ?
   _____ Full time
   _____ Part time

2. Are you currently hiring more Civil Engineering Technologists?
   _____ Yes
   _____ No

3. How many new Civil Engineering Technologists do you anticipate hiring between now and 1995?
   _____

4. **PLEASE RANK ORDER** FROM 1 (MOST LIKELY REASON) TO 4 (LEAST LIKELY REASON) the following possible reasons for hiring new Civil Engineering Technologists in your firm within the next five years:
   _____ Expansion of firm
   _____ Increased volume of business
   _____ Retirement of current Civil Engineering Technologists
   _____ Other, please explain: _____
   _____

5. How would you rate Civil Engineering Technology as a career to enter currently?
   _____ Excellent
   _____ Good
   _____ Fair
   _____ Poor

6. What percent of Civil Engineering Technologists that your firm currently employs will need formal (classroom) upgrading of their skills on an annual basis?
   _____%

7. Do you feel there is a growing need for Civil Engineering Technologists?
   _____ Yes
   _____ No

8. What specific skills and /or prior-training do prospective Civil Engineering Technology employees need before being hired? (PLEASE CHECK ALL THAT APPLY)
   _____ Drafting
   _____ Surveying
   _____ Graphics
   _____ Technical writing
   _____ Advanced mathematics, please explain: _____
   _____ Computer training, please explain: _____
   _____ Other, please explain: _____
   _____

9. What is the annual Civil Engineering Technologist salary range at your firm?
   Entry level $_____ to $_____
   Upper level $_____ to $_____

OVER

10. What related advancement opportunities are available to Civil Engineering Technologists? Please give examples of job titles: _____
_____
_____

11. Is it possible for Civil Engineering Technologists to advance to a Civil Engineering position without additional academic work and/or degrees?
_____ Yes; please skip to question 13
_____ No; please answer question 12

12. **If you answered NO to question 11**, please explain what additional academic work and/or degrees are necessary for a Civil Engineering Technologist to advance to a Civil Engineering position:
_____
_____
_____

13. Are Civil Engineering Technologist positions available to persons with disabilities?
_____ Yes
_____ No, please explain: _____
_____
_____

14. What credentials are required by your firm for Civil Engineering Technologists? (Check all that apply)
_____ No prior related work experience or education
_____ Prior related work experience
_____ Prior work experience as a Civil Engineering Technologist
_____ Associate's Degree in Civil Engineering Technology
_____ Bachelors Degree, please list acceptable fields: _____
_____
_____ Other, please explain: _____
_____

15. Do you feel that the new (non-experienced) Civil Engineering Technologists you hire are adequately prepared for the job?
_____ Almost always prepared
_____ Sometimes prepared
_____ Usually not prepared

16. Is there a need for community college Civil Engineering Technology training programs?
_____ Yes
_____ No

17. Would your firm be willing to have an Oakland Community College student work as an intern during their academic training?
_____ Yes
_____ No
_____ Uncertain, please explain: _____
_____

In case we have follow-up questions after reviewing your responses, would you please provide your name and phone number where you can be contacted during regular office hours? Thank you.

Name: _____ Phone: _____ Office Hours: _____
Name of Firm: _____

The information you provided in this survey will help OCC determine the future of the Civil Engineering Technology program. Please place the completed survey in the pre-addressed, postage-paid envelope and drop it in the mail today. Thank you.
OCC, Office of Institutional Research, 27055 Orchard Lake Rd. Farmington Hills, MI 48334

APPENDIX B
CIVIL ENGINEERING FIRMS
WILLING TO HAVE AN OAKLAND COMMUNITY COLLEGE STUDENT
WORK AS AN INTERN DURING THEIR ACADEMIC TRAINING*
(*THE FOLLOWING ARE FIRMS WHO ANSWERED 'YES' TO WILLINGNESS; THERE ARE ALSO OTHER FIRMS WHO ANSWERED 'UNCERTAIN', WHOSE NAMES CAN BE FOUND IN THE ORIGINAL SURVEY DATA)

Ramji Patel
Somat Engineering, Inc.
313-946-4966

Howard Pickens
Betty Eaton
Michigan Department of Transportation
313-569-3993
517-335-2260

Lawrence Mislinski
Harley, Ellington, Pierce Yee Associates, Inc.
313-262-1500

John Barber
Cummins & Barnard, Inc.
313-761-9130

Ray Tadgerson
Capital Consultants, Inc.
517-371-1200

Charles Biegun
Giffels-Webster Engineers, Inc.
313-852-3100

Darwin McLead, P.E.
Boldt, McLead & Johnson, Inc.
313-989-5596

Sherri Fountain
Frank A. Henderson
Soil & Materials Engineers Inc.
313-525-0310

Alonzo Harris, Jr.
Madison Madison International of Michigan, Inc.
313-963-6110

Neall Schroeder
City of Tory
313-524-3383

Donald McCormack
Hubbell, Roth & Clark, Inc.
313-338-9241

Isaac Sheppard, Jr.
Sheppard Engineering, Inc.
313-585-4240

Rick P. Harding
GZA
313-462-0207

Ralph Knop
Wade-Trim/Edmands
517-686-3100

William Otwell
City of Farmington Hills
313-473-9594

Carolyn C. Palmer
Ellis/Naeyaert/Genheimer Assoicates, Inc.
313-649-2000

D. Bodouinor
Testing Engineers and Consultants, Inc.
313-588-6200

Robert Northrup
City of Southfield
313-354-5755

David Henri
West Bloomfield Township Engineering Department
313-683-0824

Janis Bobrin
Washtenaw Co. Drain Commission
313-994-2525

Gerald Holmberg
Road Commission for Oakland Country
313-645-2000

James Latham
Black and Veatch
313-259-5300

David Bino
ETS
313-453-7900

T.L. Gilmore
Thomas L. Gilmore R.L.S.
313-471-5253

H.T. Wong
US Army Corps of Engineers, Detroit District
313-226-6793

John B. Stadnicar
Professional Service Industries, Inc.
313-255-4200

Richard Shepler
City of Berkley
313-546-2430

Dick Cob
City of Royal Oak, Engineering Department
313-544-6636

ERIC Clearinghouse for
Junior Colleges

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